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ON THE TREATMENT OF

Cutaneous Malignant Epitheliomata

(CANCERS)

✓ BY

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SOME CONSIDERATIONS ON THE TREATMENT OF
CUTANEOUS MALIGNANT EPITHELIOMATA
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It is not my intention in this paper to discuss the etiology of cancer, as at present I could add nothing definite to an elucidation of this most interesting and important subject, although much time has been devoted to it, and when the experiments and studies are more complete the question will receive attention in a later article. As far as the subject of the present paper is concerned, the views I shall advance concerning the methods of treatment will, from a practical standpoint, hold good whether the view of Cohnheim—the theory of origin from embryonic rudiments—or the parasitic, or the neurotic, or that of diminished physiological resistance power of the sub-epithelial tissues against rebellious proliferating epithelium be correct; for if the disease be caused by an organism, and the organism continues to act upon the epithelium and cause its continuous proliferation after it has invaded foreign territory it must reside within the epithelial cells, as will be seen when we come to consider the origin of the secondary tumors; or if Cohnheim's theory be correct, the newly formed cells already possess the ability and predisposition to multiply; or if the disease consists in the invasion of foreign territory in consequence of diminished resisting power in the latter, the epithelial cells would still be the offending agent; consequently, whichever of these theories be correct, the complete destruction or removal of the morbid epithelium would be equivalent to a removal of the disease. I might here remark, and for reasons which will be given at another time, that I do not believe that the theory of Cohn-



heim will account for the local and general infective character of malignant new growths, whether epitheliomatous or sarcomatous.

In this paper I shall make use of the term "malignant epitheliomatous new growth," as synonymous with carcinomatous, whether the new growth proceed from the cutaneous surface, or from a gland structure.

For the elucidation of my views it will be of advantage if we compare the manner of growth in simple tissue tumors with that in carcinomatous new growths. (I prefer the term "new growth" to that of tumor, as I do not believe that either carcinoma or infective sarcomata are to be regarded as examples of tumors proper on account of their mode of origin and clinical course; but to avoid too frequent repetition of a word, will use both terms in the same sense.)

I think it will be admitted by most histologists that the view of Cohnheim as to the origin of the simple tissue tumors, lipoma, chondroma, etc., from embryonic rudiments is the probably correct one, and that such tumors never arise except in an indirect manner, as the result of an injury to a part. These simple tissue tumors increase in size by continuous multiplication of cells derived from the embryonic rudiments, and as the tumor increases in size by centric growth the tissues of the part in which it is situated are pressed upon, until, finally, the compressed tissue adjacent to the new growth is arranged as a more or less well-marked capsule, within which capsule all the tumor is contained. There is no infiltration of the tissue outside the capsule, no peripheral extension growth, consequently, an operation which results in removing all the tissue within such a capsule is equivalent to a complete removal of the tumor, and as the capsule is usually makroscopically easily

recognized, the question of the extent of incision necessary in a given case is easily settled.

When, however, we compare the method of growth and extension of cancer, it will be easily seen that the limit of tumor invasion cannot be easily recognized, or even conjectured, and that, whilst removal of all the pathological tissue in either case would be tantamount to a permanent cure, yet the question as to the manner of removal may require to be decided differently in the two cases; in other words, it does not follow either from the manner of origin or mode of extension that carcinoma should be

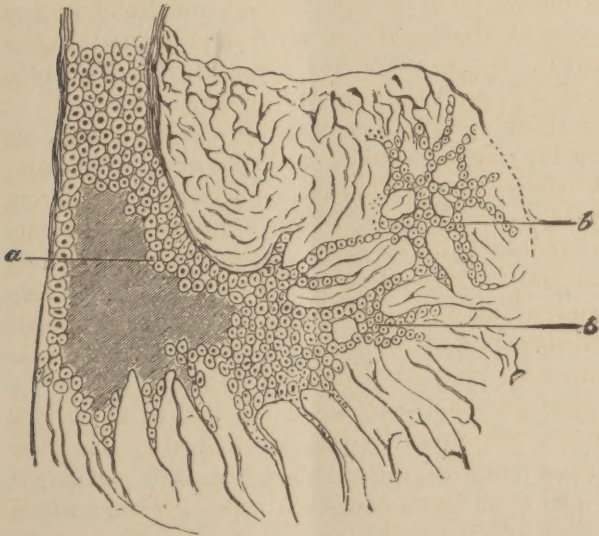


Fig. 1.—An acinus of a mammary gland showing growth of cancer and infiltration of the surrounding tissue (after Waldeyer). *a*, cavity of acinus with proliferation of glandular epithelium; *b*, pathological epithelium travelling along the lymph spaces and infiltrating the tissues.

treated in the same manner as a simple tissue tumor, and when situated upon the cutaneous surface, for instance, be removed by the knife as the best method of treatment.

Let us consider the manner in which a carcinomatous new growth extends at the seat of a primary lesion. In Fig. 1, copied from Waldeyer, is shown the manner of extension in cases of carcinoma of the mammary gland, and this method holds true for cancer in any location.

The drawing represents a terminal acinus of the mammary gland where the epithelium is not arranged in a normal manner along the basement membrane, but in an irregular manner, and having undergone proliferation, fills up the greater part of the lumen. The basement membrane of the acinus at its blind extremity has disappeared and the proliferating epithelium has invaded the neighboring tissue. The changes occur in the following order: first, there is a proliferation of the glandular epithelium, then destruction of the basement membrane, and finally, infiltration of the surrounding tissue by way of the lymph channels. The nearer the gland the larger the columns of invading epithelium, whilst at the periphery the infiltrating cells may appear as isolated epithelial elements or columns of epithelium arranged in single file. This drawing shows how the epithelium infiltrates the connective tissue, travelling along the lymph spaces at first, and in the most gradual manner losing itself in the healthy tissue, the foremost of these malignant infiltrating elements being of necessity a single epithelial cell, and a whole column may consist of single cells arranged in file, as shown in this figure and in Figure 6. The new elements in their earliest stage resemble embryonic elements and can-

not always be diagnosed with the microscope from such bodies; they furthermore, like these, can perform amœboid movements and travel from one part to another. The tumor, therefore, spreads not by centric growth, giving a sharp margin easily recognized, but by growth at the periphery, and by an infiltration of the tissue to an extent not recognizable by feel or unaided sight. So insinuatingly and so solitary

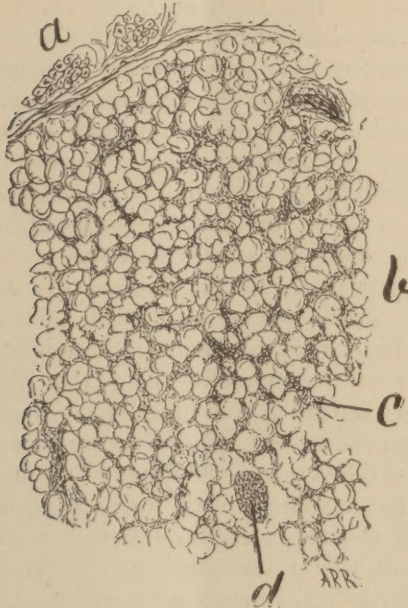


Fig. 2 —Section of tissue from a case of carcinoma of the mammary gland. *a*, cancer tissue from apparent margin of tumor; *b*, fatty tissue throughout entire drawing; *c*, dilated capillaries containing excess of corpuscles; *d*, an isolated group of cancer epithelium.

in their arrangement do these epithelia sometimes travel in the lymph spaces that even a microscopical examination of the tissue beyond the area of excision,

in a mammary cancer for instance, may fail to detect them, and yet the subsequent history of the case, a so-called recurrence, leaves no doubt of their having been present.

To show how this epithelium can travel and locate at a distance from the tumor mass, I have drawn in Fig. 2 the condition in a carcinoma of the breast, operated upon with the knife by myself seven years ago.

The tumor mass was not larger than a small hen-egg and appeared to be very sharply limited, yet this drawing shows that pathological epithelium was present in the periglandular fat tissue at a considerable distance from what appeared to the feel and naked eye as the limit of the tumor. Fortunately, a large amount of tissue was removed, as much as if the tumor had been many times as large, and there has been no recurrence of the disease. No epithelium was found in the area between *a* and *b*, but individual cells, perhaps, were there and not recognizable. This drawing shows, as does also Fig. 1, that very early in the disease the infiltration has very likely extended to an unexpected distance into the surrounding tissues.

We find the same method of extension in cutaneous cancer, that same infiltration into areas not yet microscopically affected. In Fig. 3, is shown under a low power, a section of an epithelioma of the gluteal region which had grown very slowly, and showed no secondary infection of lymphatic glands, although at the time it was removed by the knife, it was about six inches in length. The elevated margin was very sharply limited and not more than half an inch in diameter. The surgeon who operated cut about one inch outside of the margin with the object of removing all of the pathological tissue, but subsequent



Fig. 3.—Section of a cutaneous epithelioma, from the gluteal region, under a low power. *a*, corneous layer; *b*, normal rete; *c*, corium; *d*, hypertrophied rete (epitheliomatous); *e*, hair follicle orifice area; *f*, apparent limit of morbid process; *g*, excretory sweat duct; *h*, sweat gland coil.

examination with the microscope showed a few epithelia close to the line of incision, and the subsequent history of the case, a recurrence within six months, showed that the incision was not in absolutely healthy tissue. Subsequently, the case was treated by caustics with a more satisfactory result.

The elevated margin ceased at *f*, but there was some slight enlargement of several papillæ beyond that, as also a disturbance in the circulatory system beyond *f*, mild inflammatory changes, not shown in the figure as the object of the drawing is to show that although the process seemed to end abruptly at *f*, yet microscopically it did not, as pathological epithelium was found within the corium much beyond that point, and in reality they extended into the supposed healthy tissue beyond the place of incision at *b*, as the disease reappeared within a few months.

In Fig. 4, is represented under a higher power an ordinary epithelioma of the nose in which the infiltration into the corium and the secondary inflammatory round-celled infiltration are well marked. The section is from a central part of the tumor and does not show the extent of infiltration at the periphery, but only the manner in which the process extends.

In the so-called rodent ulcer, a variety in my opinion of epithelioma, the extension of the disease is very slow indeed, and in such a case one would naturally suppose that the infiltration beyond the apparent margin of the growth would extend to only a very short distance. Examinations of sections of these new growths, however, have shown the same insidious infiltration in the form of round columns of epithelium, or epithelia in varying numbers in single file, pushing their way within the lymph spaces, or as isolated epithelial elements, advanced pickets, from which groups form later. In Fig. 5, is represented a

section of the peripheral portion of such a rodent ulcer, and the similarity of mode and manner of extending as that taking place in the tumor represented in Fig. 1, is quite striking.

The increase of the tumor by continuous growth of the peripheral cells and infiltration of the surrounding tissue, not *en masse* but gradually and without

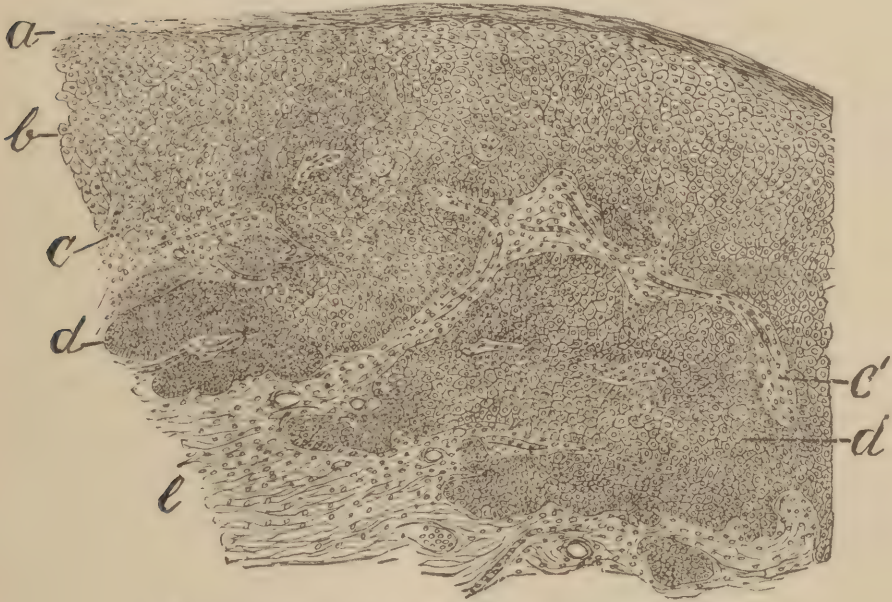


Fig. 4.—Section from an epithelioma of the nose. *a*, corneous layer; *b*, rete; *c*, papillæ of corium; *d*, growth downward from the rete; *e*, inflammatory round-celled infiltrated corium.

order, in an irregular manner as regards the line of limitation, produces a condition entirely different from that produced by centric growth, as occurs in the simple tissue tumors. The cells in this disease proliferate more slowly than in mammary cancer, or ordinary epithelioma, consequently the columnar form

of arrangement is usually well marked, but the advanced picket arrangement as seen at *c*, shows an

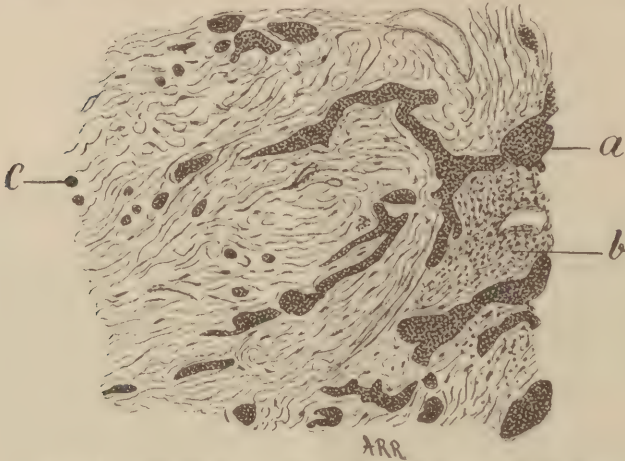


Fig. 5.—Section of the peripheral portion of a rodent ulcer, showing manner of infiltration of the connective tissue. *a*, columns of epithelium lying in lymph channels; *b*, small celled infiltration (inflammatory); *c*, a small group of epithelial

extension whose limit is only to be recognized by microscopical examination.

In Fig. 6 is shown, under a higher power, a single file of epithelia extending in an, as yet, almost normal connective tissue area.

The lower portion of this column represents the most peripheral lying cells, and the last epithelium figured, the most advanced one, appears as a nuclear body with undoubted locomotion power and predisposition for further invasion of the tissues.

In Fig. 7, also from a case of rodent ulcer, the epithelium has penetrated the sarcolemma and is causing degeneration of the muscle fibre.

At *a* the epithelium has penetrated the sarcolemma

and later would cause degeneration, either simple atrophy or fatty degeneration of the muscle fibre.

At *b*, the degeneration of the fibre is almost complete. There is, it seems, a marked tendency in some cases of cancer to this infiltration of the muscular structures, depending, no doubt, upon the arrangement of the lymphatic vessels and the comparatively slight resistance to invasion of that area.

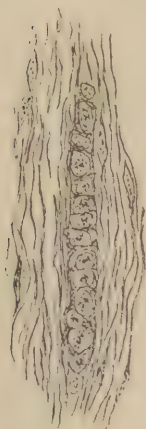


Fig. 6.—Drawing showing epithelial infiltration, the cells being arranged as a continuous row composed of single cells.

In some cases of mammary cancer the so-called recurrence of the disease after operation appears as an irregular infiltration into the sub-epidermal tissues of the thorax which, when extensive, produces the condition known as *cancer en cuirasse* of Velpeau. A study of the manner in which the infiltration spreads shows that it does not differ from that in other forms of cancer, there is the same travelling through the lymph channels, the connective tissue, when first invaded, being normal, and, later undergoing various degrees of inflammation from as yet undecided factors; but at no time do the connective tissue corpuscles or the fixed elements of any tissue invaded take on such processes as result in the formation of elements having the character or

vital properties of the epithelium derived from the epithelium of the primary seat of the new growth. This statement of the origin of all the pathological epithelium in cancer is opposed to the views of some observers, but in my opinion is so correct that any

discussion of the question in this paper is unnecessary.

In Fig. 8 is shown a section of a secondary nodule of the skin in a case of *cancer en cuirasse* following operation for the removal of a mammary gland for

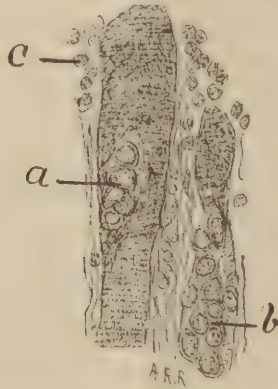


Fig. 7.—Invasion of striated muscle fibres by epithelial cells in a case of rodent ulcer. *a*, cancer epithelium; *b*, cancer epithelium; *c*, inflammatory round-celled infiltration of the connective tissue.

cancer. The infiltration into the skin and subcutaneous tissue without any appreciable nutritive changes in these tissues, is well shown by the absence of all signs of inflammation in the connective tissue, and although pathological epithelia are present in large numbers close to the epidermis, yet the epithelia of the latter do not undergo proliferation: they would, however, have undergone a destructive degeneration at a later stage.

This drawing, like some of the others, shows the manner of extension through the lymph channels and the small size of some of the cell groups, whilst the normal condition of the connective tissue and corpuscles shows that the latter have taken no part in the production of the pathological epithelium.

From a consideration of the above described methods of growth and extension in malignant epitheliomatous tumors we learn that in any given case, even in the very early stages, there is no capsule enclosing all the pathological epithelium, and no well marked limit to the infiltration ; but that the periphery—the limit of infiltration—is an uncertain, an irregularly defined one, and always extends much beyond the makroskopical one, except in the possible case of the disease of the mammary gland being recognized before the basement membrane of an acinus has been broken through.

In secondary tumors the results of microscopical examinations, as well as a study of the characters and tendencies of the epithelium, as regards form, arrangement, and chemical changes, make it altogether probable, if not certain, that the epithelium of the secondary tumor has its origin from the epithelium of the primary tumor by a direct travelling through the lymph channels of solid bodies, the products of the epithelial proliferation at the primary seat, these bodies and their progeny naturally having the ability to continuously multiply, and thus form the mass composing the epithelium of the secondary tumor; the liver epithelium, for instance, does not seem ever to assist in the formation of the tumor epithelium, but to undergo only a degeneration, a circumstance which seems to argue against the parasitic theory ; for, as there can be a primary cancer of the liver, the liver epithelium should be favorable ground for an organism and hence, should it be invaded by a cancer organism, would probably take an active part in the pathological process and undergo active proliferation, instead of degeneration. If it be true that the secondary tumor arises in the manner above described, then in the tissues lying between the primary and



Fig. 8.—Section of a secondary nodule of the skin in a case of *cancer en cuirasse*. *a*, normal rete; *b*, cancer cells in a papilla; *c*, group of cancer cells from which some have fallen out in preparing section; *d*, corium; *e*, space from which cells have fallen out.

secondary tumors pathological epithelium must exist. Thus, in mammary cancer with secondary infection of the lymphatic glands in the axilla, the lymph channels in the area between these two tumors must contain a greater or less number of cancer epithelia, the non-removal or non-destruction of which, even when the axillary glands as well as mammary gland are removed, must be followed by a continuation of the disease, and it is evident from clinical history of operated cases that probably a single epithelial cell may be sufficient for the nucleus of a recurrence.

Treatment.—Admitting then the correctness of the view stated above as to the origin of the primary tumor and of the secondary tumor, the object of treatment in every case where it is possible, should be the removal or destruction of all the pathological epithelium wherever situated, whether at the primary seat, the secondary seat, or the intervening area.

If cancer is a parasitic disease, we may hope some day to find an agent—a drug administered or applied in some manner that will kill the organism, or make the ground unfavorable for its existence. At present the question is unsettled, and thus far, empirically or experimentally, no drug has been found to accomplish that result, and for the present, at least, surgical means are the only ones we possess for the removal of the growth; and the comparative value of the different surgical means usually employed will now be considered.

In the simple tissue tumors the new growth when favorably situated can always with certainty be removed by excision.

In cancer, we find, however, that there is no limiting membrane, no definite guide as to the extent of the infiltration beyond the tumor mass, and herein

lies the question of the method of operating in different cases.

Starting with the view that the method of removal that gives the best results, is that which removes with the greatest certainty *all* of the morbid epithelial tissue is the preferable one, even if the resulting deformity or pain connected with the operation be greater than by other methods, and that of two methods of operation promising equal results, that causing least deformity and least pain should be employed, we will now discuss these methods.

The means usually employed are operations by cutting instruments, electricity, curetting, curetting and caustics combined, and caustics alone.

We will first consider the use of the knife, the cutting method, in a primary epithelioma. From a study of the mode of origin, the method of extension, and cause of recurrence, it is clear that if the surgeon makes his incision beyond the limit of epithelial infiltration there can be no recurrence of the disease. I use the term recurrence here in the usual sense of that word, but in reality a recurrence only happens when the second tumor formed does not depend upon epithelium from the seat of the first tumor. All other cases are examples not of recurrence but of a failure at the time of operation in removing all the cancer epithelium, and, consequently, after a variable period, depending partly upon the amount of this cancer epithelium not removed or destroyed, and partly upon the nutritive conditions, a mass makroscopically recognizable is observed. An epithelioma of the lip may recur after complete removal of a previous epithelioma of the same part, but in mammary cancer, if the gland has been removed by operation, there is no gland epithelium left from which a true recurrence could occur.

Admitting then that if all the pathological epithelium is removed there can be no so-called recurrence, we have to consider under what conditions is the cutting operation the best method for its removal. In the case of mammary cancer it must be admitted that one can with the knife remove at a single operation, and without pain or special danger, a mass of tissue which could not be removed by other methods without causing much suffering, lasting for a considerable period. If the growth is a recent one and the operation is performed with due regard to the possible extent of the infiltration, an excellent result is to be expected. I have in mind several cases in my practice and in that of others, in which, after several years, there has been no sign of a recurrence. I have, however, also seen a considerable number of cases of not very advanced cancer where, from want of belief, probably, in the likelihood of distant slight infiltration, the parts appearing makroscopically healthy, a recurrence has taken place either from the base or along the scar margin within a few months time. About a month ago I applied a caustic paste to such a case, one that had been operated upon last October with recurrence along the line of incision. If the condition represented in Fig. 1 were borne in mind, and, furthermore, that there is great tendency in these cases of mammary cancer for the infiltration to pass into the pectoral fascia and between the muscle bundles, and also towards the cutaneous surface in the area of the nipple, and the operator would cut wide of the nipple, as wide as consistent with the bringing together of the flaps, and also remove as much can be safely done of the deep parts, as well as of the fat tissue outside the gland, the tissue forming the mamma as a whole, irrespective of the size of the

cancer, I am certain that recurrences would be much rarer than they are at present. As already stated, recurrences always show that some of the pathological epithelium has been left behind, and from the number of these recurrences in even rather recent cases I am inclined to think that some of them are the result of not removing all the tissue which could have been removed consistent with the life of the patient, irrespective of the resulting deformity or slow healing. In more advanced cases, where the axillary glands are affected, the same principles hold true, the gland should not simply be "shelled out," but periglandular tissue also should be removed or cauterized, and, from what has been previously stated, as much tissue as possible should be removed in the area through which run the lymph channels between the primary and secondary tumors; for not to remove that, could have but one result—a recurrence of the growth. Whether after the operation the parts should be treated antiseptically in order to obtain, if possible, healing by first intention or not, will be touched upon later, when we have discussed the action of caustics. What can be accomplished by other means in mammary cancer will also be discussed later.

There are some parts of the body subject to cancer where the knife seems, in my experience, to offer the greatest hope of cure. Upon the flexor surface of the forearm, near the wrist, an epithelioma sometimes develops, and is probably indirectly caused by the irritation from a shirt sleeve button. Unless seen very early these cases, in my experience, are difficult to handle with caustics, and, as a rule, amputation of the arm above the elbow is probably the best method of treatment. A local excision would not, I think, compare in value with caustics any better than

in epithelioma of any cutaneous surface and this will be weighed directly.

What is true of epithelioma of the forearm is also true of cancer of the penis and requires no further discussion. If small and favorably situated it can be removed by caustics or excision, if advanced, amputation is the only resource.

In epithelioma of the scrotum, a part from which it is usually possible to remove a large amount of tissue without injury to the patient, the knife will be the best agent in the majority of cases.

On those parts of the skin where the general surface is flat, as on the forehead, prominent part of cheek, lips, back or front of neck—at situations where the collar button irritates the part, etc., it is not difficult to remove a considerable area of skin without producing deformity, but on some other parts, as when the cancer is situated upon the nose, and especially upon the alæ, a frequent situation, it is not possible to remove, as a rule, the necessary amount of tissue without causing more or less mutilation, and if the disease can be removed equally well by other means which do not cause noticeable deformity, the knife should not be used. I will endeavor directly, to show that other means are much to be preferred under these conditions, as well as in epithelioma in general of the cutaneous surface, with the exceptions already referred to.

Having decided to operate with the knife upon a given cancer in a favorable situation, such as one upon the forehead, an epithelioma for instance of slow growth and makroskopically sharply limited, the usual procedure is to cut some distance beyond the makroskopical margin, and having removed a certain amount of tissue bring the edges of the wound to-

gether and treat the part upon antiseptic principles. If the surgeon has removed *all* of the tumor, such a course must be a correct one, but practically, it is a fact that very frequently there is a recurrence of the disease after a few months or possibly a year, or even two years.

I have already referred to a case of epithelioma of the gluteal region, a case operated upon by a surgeon of experience and ability, and in this case, with the special object of showing me that he would remove enough, the incision was unusually distant from the elevated margin, yet there was a recurrence of the disease within a few months. If a few scattering epithelia happen to be situated beyond the line of incision, what is the result when the wound is treated antiseptically? The part heals by first intention; there is no agent at work to injure the tissues, every cell, whether normal or pathological in the tissues, is uninjured and only a formative process occurs. If a single cancer cell is left, even at the margin of the wound, it is not destroyed, and during the formative process, a period during which a good supply of nutrition is brought to the part, this epithelial cell is placed in a specially favorable position for proliferation. If the part were not treated antiseptically and suppuration followed and the cancer cells were situated near the margin, the inflammatory process would probably destroy the pathological elements, and thus a result would be obtained equal to that obtained by a more extensive incision, whilst the wound would subsequently close by granulation tissue formation, leaving an insignificant scar; or what I prefer in such cases of removal by the knife, is, immediately after cutting to touch the base and margin with caustic potash, for instance, and then

bring the parts together and encourage the healing process by whatever means are advisable. If the wound be not treated antiseptically and pathological epithelia exist some little distance from the margin, a slight inflammatory process preceding healing would probably not destroy them, and the part in which they reside would soon be in the condition known as condition of reaction after injury and the cells would, consequently, proliferate with increased rapidity. I have, however, occasionally seen a small superficial epithelioma destroyed by a mild inflammatory process alone. Unless, then, all of the pathological tissue be removed, the part in such cases should not be treated antiseptically, otherwise a recurrence is certain; but if the wound be cauterized with caustic potash, or chloride of zinc, or other strong caustic, so as to produce an intense inflammation without causing necrosis *en masse*, all cancer cells within a considerable distance of the cut surface will be destroyed, and a recurrence less likely to occur, and also in this manner, as much pathological tissue would be removed as by a more extensive incision. There are other points in this connection which will be discussed when considering the use of caustics.

It would seem, then, that the advantages of excision, as regards extent of surface and depth of tumor in not very advanced cases, are, no pain, quick removal of the tumor, and rapid healing of the wound; but to accomplish as much as can be done by caustics or by knife and caustics combined, more tissue must be removed than when these means are employed.

If the tumor is situated upon an ala of the nose, and the growth be thoroughly removed by excision, the consequent deformity, in my opinion, is a serious objection to the operation, and it should not be

resorted to when much superior methods can be employed.

The use of electricity, except as a caustic, has not been shown to be a reliable agent, although it is possible that new methods of employment may give better results than those already obtained. I have seen tumors diminish in size under the use of electricity, but never a complete removal. With a galvano-cautery or a thermo-cautery, the tissues can be destroyed as well as with caustics, and without pain, if cocaine be first injected into the tissues. There are certain parts of the body where the method is sometimes advisable, as when the tumor is situated in the roof of the mouth, or close to the inner or outer canthus of the eye. It is not suitable, I think, for large or deeply seated tumors, and as it destroys equally normal and pathological tissues it is followed by more scarring than after the use of certain caustics. If it is used, the tumor mass should be thoroughly destroyed, and if that be not done at a single operation the second operation should not be delayed many days lest the part get into the condition of reaction after injury.

Scraping or curetting is often employed and has many advocates, but I think a little consideration of the subject will suffice to show that the method should not be employed unless in very small and superficially seated tumors, and, even then, other methods, I believe, are more certain in their results. The operator, as a rule, scrapes away a less quantity of tissue than is removed by the knife, and, consequently, if the infiltration extends into the tissues in the manner I have endeavored to show in this paper, a considerable amount of epithelium must remain behind in the part. The pain is greater than in incision, and it also requires to be performed a number

of times at intervals. The serious objection to this method in my mind is that all of the pathological tissue cannot be removed in this way at a single sitting, and that in the intervals between the scraping operations, the part is in a condition of reaction after injury, there is more blood brought to the part, and the cancer cells will grow with much greater rapidity than if the part had not been operated upon, and as the lymph vessels become dilated there is a danger of rapid extension of the disease. Some writers maintain that the operator can recognize when he reaches healthy tissue, but such has not been my experience, and a consideration of the microscopical character of the manner of spreading the tumor makes it difficult to understand how that is possible to do so. Practically, I have had unsatisfactory results, and from cases which have occasionally come under my care, I am satisfied that other operators do not always fare better than I have done with the method.

Prof. Vidal, of Paris, treats superficial epitheliomata by scraping away all the soft tissue, and ceasing when considerable resistance to the instrument is encountered, the wound afterwards being treated night and morning with finely powdered chlorate of potash. If any of the morbid tissue is left the operation is to be repeated. This method, I feel certain, should not be employed in any but very superficial tumors.

Some advocate scraping and subsequent cauterization, but it would be better, I think, to excise what is usually scraped and then cauterize in the manner mentioned when discussing the use of the knife. Scraping and then cauterizing with nitrate of silver and other mild caustics should not be employed for reasons to be given later in the article.

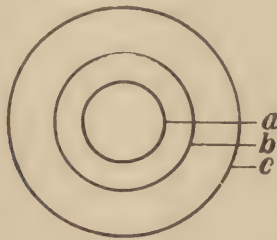
Caustics of various kinds have been used for many years for the removal of cancer both by the regular profession and by charlatans. Perhaps their employment by the latter has interfered with the credit they deserve at the hands of the former, and it will be my endeavor here to show that the use of certain caustic agents, judiciously and properly applied, is of the greatest service in the treatment of cutaneous cancers, and, in the majority of cases, far superior to the knife in securing their permanent removal with the least amount of deformity. The cynic who sneers at the use of caustics in any and every case, either has had no experience in their use, or his method of application has not been guided by any clear conception of the subject discussed in the first part of this paper. That charlatans use caustics does not prove they have no value, in fact many physicians throughout this country have informed me that of their own knowledge these charlatans have cured many cases of mammary and cutaneous cancers, without the use of the knife. If the members of the regular medical profession will carefully consider the views I am endeavoring to elucidate in this paper, and act accordingly, I am satisfied that examples of innumerable cases of cancer which now remain untreated until it is too late for any operative method to be of much advantage, will be permanently removed, and thereby many lives saved from a slow and painful death; for it must be admitted that epithelioma, in its early stages too often does not receive proper care from the general physician.

From what I have already written, it is clear that no caustic should be used that does not rapidly and effectually destroy, either directly or indirectly, the epitheliomatous tissue. The caustic agents which have been employed in this disease, are, particularly,

nitrate of silver, nitric, sulphuric and hydrochloric acids, acid nitrate of mercury, carbolic and acetic acids, ethylate of sodium, arsenious acid, chloride of zinc, and caustic potash.

With these caustic agents tissue can be destroyed to a greater or less extent with a greater or less degree of rapidity. Some of them, as nitrate of silver, carbolic acid, etc., act very slowly, and to a slight degree, whilst others, like caustic potash, penetrate the tissues quickly and cause rapid necrosis.

The objections to some and the advantages of other of these caustics, will be best illustrated by the use of the accompanying diagram.



Suppose we have to deal with an epithelioma of the skin, occupying, makroscopically, as large an area as that enclosed within the circle *a*. Outside this area and extending as far as *b*, microscopical examination will show that there is more or less circulatory disturbance and epitheliomatous tissue as an extending infiltration. The area lying between *b* and *c* may or may not contain cancer cells, and may show slight or no circulatory disturbance, whilst outside of *c* we will suppose that the tissue is perfectly normal. Now, if the tumor were to be removed with the knife, the operator rarely thinks of cutting beyond the circle *b*, and if the part is treated antiseptically, and there are cancer cells beyond that area, there will

be a recurrence of the disease. If the incision is carried to *c*, there can be no recurrence if the incision has been carried deep enough. The resulting deformity will vary according to the extent of the incision and the location of the tumor.

If one of the weak caustics is employed, nitrate of silver for instance, what is the effect upon the part? Only a portion of the tumor mass can be destroyed at one sitting, as the agent does not penetrate deeply, neither does it injure the tissue to any extent beyond the portion necrosed; there will be some inflammation, which gradually loses itself in the surrounding skin, and after a few days disappears. Taking the drawing for illustration, the nitrate of silver destroys only a portion of the tumor lying within *a*. The rest of it, and some of that lying within *b*, will undergo slightly increased inflammatory changes, whilst a part within *b* and all within *c* will probably be unaffected. As the tissue of the tumor area soon recovers from the injury, the portion of the tissue outside of the necrosed area is then in the state known as condition of reaction after injury, there is more blood and nutriment brought to the part, the lymph channels are enlarged, and every condition is favorable for a more rapid proliferation and infiltration of the epithelial cells than existed before the cauterization. Even if the part were cauterized every day, which could scarcely be done, the tissues between *b* and *c* would not be injured to any degree and there would be great danger of producing the condition favorable for the spread of the disease. If the above statements are correct, and practically, as well as theoretically, I have found them to be so, then the use of mild caustics leaves the patient in a worse condition than if the disease had not been interfered with. I have observed the bad effect of

these cauterizations most frequently in cases of cancer of the lip, usually on account of error in diagnosis, but the same result would of necessity follow wherever the disease be situated. How many cases of cancer of the cervix uteri must have been aggravated by the use of that omnipresent stick of silver nitrate? What holds true of nitrate of silver, holds true of all other mild caustics—they do not destroy with sufficient rapidity, and consequently they indirectly favor the process of proliferation and infiltration.

The mineral acids can be employed if the epithelioma is very small and superficially situated, but should not be used if the tumor is deeper seated, as other agents act with more certainty. I have never used the acid nitrate of mercury and think it only suitable for the same kind of cases as nitric acid.

The three agents with which I have had the most experience and which have given me the best results, are caustic potash, chloride of zinc, and arsenious acid.

Caustic potash quickly liquefies tissue, and with this agent one can at a single sitting destroy a large amount of tissue, and produce the following changes in the surrounding part. Suppose the cancer is as large as the area within the circle *a* of Fig. 9, with a stick of caustic potash, all of this tissue can be destroyed, necrosed or liquified in a few minutes, at a single sitting. The action of the caustic, however, extends further than the part directly necrosed, and its use is followed by marked inflammatory changes in the surrounding parts, all of the tissue lying within *b*, will undergo an intense inflammatory process which may or may not lead to destruction of the tissue. If it is destroyed from the intensity of the inflammatory process, then there is a wound as large as that made by the knife. In that case the tissue outside of *b*

and within *c* will be also much inflamed, and the inflammatory process will probably extend still further into the surrounding tissues. As there are probably epithelial cells in the area lying between *b* and *c*, they will be subjected to the inflammatory process, and as pathological tissue succumbs to this process more readily than normal tissue, these cells are likely to be destroyed by an inflammation of such an intensity as would still leave the tissue within which they reside in a condition of ability for restoration to a normal state. The degree of intensity of inflammation must, however, be considerable to destroy the morbid tissue. As the degree of inflammation will depend upon the vulnerability of the tissue, and the vulnerability upon the condition of nutrition, this condition depending upon the extent of the infiltration by the epithelial cells, and, as we have already noted that a circulatory disturbance is always present in cases where the epithelium has already penetrated the connective tissue, so the amount of inflammation following the use of the caustic is a valuable guide as to the extent and amount of the epithelial infiltration. If the tissue between *a* and *b* subsequently breaks down completely, it is because the infiltration was considerable in that part, and the tissue, consequently, was very vulnerable, and if the inflammation is rather intense between *b* and *c*, it is probable that epithelial cells were present and had interfered somewhat with the nutrition of the part. Supposing such to be the result of the caustic and that all the tissues within *b* has been destroyed, the inflammatory process will destroy all the pathological epithelium within *c* and probably beyond that line; that is, you accomplish with the potash a result equal to that to be obtained by the knife when the incision extends beyond *c*, at the same time the wound produced extends only to *b*.

If the part within *Z* is not destroyed but is much inflamed, the epithelium will be destroyed within that area, and even beyond, if any should exist, and in that case the caustic produces a small wound and gives better results than a more extensive removal of tissue with the knife would do.

From these considerations I would maintain that in epitheliomatous tumors, during the earlier stages, and even when they are of considerable size, the use of caustic potash will give much better results as regards complete removal of the disease than can be obtained with the knife, provided the same area of tissue is destroyed or removed in both operations. But there is another point upon which I am pretty well satisfied, and that is, that from the use of the caustic potash, and some of the other caustics, there is formed in the tissues cauterized a tox-albumen which is destructive to the cancer cells, or organisms, if such exist. Perhaps it is the inflammatory process alone that gives such good results in the primary tumor, but when one sees enlarged lymph glands at a distance from the primary tumor diminish in size after the cauterization, as I have often seen, it is difficult to avoid the view that such an agent must be acting. Some of these glands may have only undergone simple inflammatory enlargement, but others, I am satisfied were cancerous. If this is true it may give a clue to future successful experiments, especially if the parasitic theory be the correct one. I would advise the use of caustic potash in all cases of small tumors situated upon the forehead, cheeks, lips, and some other parts of the body, but would not use it near the eye nor upon the alae of the nose, nor when the tumor is near an important blood vessel. In early epithelioma of the lip it is a valuable agent. I remember about ten years ago a patient from Canada came

under treatment for a superficial, but extensive epithelioma of the lower lip. The tumor was one inch in length and had existed several months. Other members of the family and several relatives had suffered from cancer, gland or cutaneous. This patient remained in New York only one week, during which time I cauterized the lip twice with the stick of caustic potash. As I was afterward informed, a thick scab was produced, which, after several days fell off, leaving a raw dirty-looking sore, which was dressed with a simple ointment and soon healed. I saw this patient last year and close examination failed to show a trace of epithelioma, or of scar tissue, or of any deformity. He gave up smoking a pipe at the time he was treated, but has resumed the habit the last three or four years. I have treated other cases where the tumor was deeper with equally good results, except, that as a rule, some cicatricial tissue formation, a scar, remains to show the former seat of the disease. For small tumors, when you wish a positive result with one sitting, the potash is probably the best agent to use. It is especially indicated in cases of papillomatous epitheliomata. The objection to the caustic potash, is, that it destroys normal tissue almost as easily as pathological, and consequently should not be used where it is important to save tissue, if we have an agent that will be more elective in its action. Its use is attended with much pain, but the patient could be anæsthetized or local injection of cocaine employed if necessary, so that is no disadvantage as compared with the knife.

Chloride of zinc can be used either in stick form, or in solution, or in a paste. It does not destroy tissue so rapidly as caustic potash, and it causes much more pain, which also lasts for a much longer period. It destroys both normal and pathological tissue, although

I do not think with an equal degree of rapidity, and is a most valuable agent in the treatment of epithelioma. In all the cases mentioned as suitable for the use of the potash the zinc can also be employed, and, in the stick form, on account of its slower deliquescence, and the ability to use it as a pointed pencil or arrow, it is much to be preferred to the former for some cases. In the form of arrows Maisonneuve used it in the treatment of mammary carcinoma, a path being made first with a bistoury and the arrow then inserted to the base of the tumor. As many arrows as seemed necessary to destroy the tumor were inserted at a certain distance from each other. Whilst I would not treat a primary cancer of the mammary gland in this way unless the patient absolutely refused removal with the knife, yet there are no reasons why the method should not be successful, and in recurrences, the use of the stick form enables one to destroy, with considerable precision, deeply seated masses of morbid tissue. In epithelioma of the roof of the mouth and in that of the lip, the stick can be used with good results. In those cancers of the lip with a tendency to the nodular form of tumor, the stick can be pushed to the base, and the part cauterized to any desired extent, or a piece of the zinc can be imbedded at the base and allowed to dissolve, the size of the piece depending upon the amount of necrosis desired. The stick is also used to cauterize the base of cutaneous epitheliomata removed by the knife, or curette, and the wound left after removal of the mammary gland by excision. When the epithelioma is situated near the outer or inner canthus of the eye, or even when the lid is attacked, a pointed stick can be used very effectively, and with safety. In such a case caustic potash, or a caustic in solution, or in paste form, is liable to cause too much inflammation of the

eye and is not enough under the control of the operator. A solution of chloride of zinc, 50 per cent., with or without cocaine, can be used for touching the wound, after other operations, or injected into any desired portion of a tumor. The cases suitable for its employment easily suggest themselves to the physician and further reference at this time is not necessary.

A chloride of zinc paste is one of the best means we possess in the treatment of cutaneous epithelioma, and has also been strongly recommended for mammary cancer. The formula usually employed is that known as Bougard's paste, and is as follows:

℞ Farinæ tritici (wheat flour)	
Amyli	aa ℥ i
Acid. arsenios. pulv.	grs. viij
Hydrarg. sulph. rub.	ʒ ii
Ammon. mur.	ʒ ii
Hydrarg. bichlor. corros.	grs. iv
Zinci chlorid. cryst.	℥ i
Aquæ fervid.	℥ iss

The first six substances are finely ground and then mixed in a glass mortar. The chloride of zinc is dissolved in the boiling water and this solution slowly added to the powder, the contents of the mortar being kept rapidly moving with the pestle, until all the solution is added; then let it stand for about 24 hours and the paste is ready for use. The paste is spread thickly on a piece of muslin and left upon the part about 24 hours. If the application has been successful all of the makroscopical cancer mass should appear to be necrosed completely, and the tissue beyond inflamed in the manner already described as occurring after the use of caustic potash. As the paste does not act so quickly as the potash; in other words, as the tissue is able to resist its injurious action for a much longer period than is the case with the other

agent; and as pathological tissue succumbs easier than normal tissue, it is possible to remove an epithelioma by means of the paste with less deformity— by the production of a smaller open sore, than with the caustic potash. It is therefore the more preferable agent if the epithelioma already occupies a considerable area. If the tumor is a small one, say the size of a pea or slightly larger, the resulting scar in either case is insignificant and both agents would give satisfactory results. By the slower forming inflammation from the zinc paste, the degree of inflammation can be better regulated than with potash, and epitheliomatous infiltration, if any exists, can be destroyed for a considerable distance beyond the area completely necrosed, without destroying beyond restitution the original tissue of the part. If the first application is not positively successful, a second application should be made within a few days, before the part has time to take on a formative process, for reasons already given. A large surface can be treated at a single sitting with this paste, as there is no danger of poisoning; but as it produces very great pain the patient's feelings must sometimes be taken into consideration. If the affected area is already large it is advisable to destroy first that part encroaching on important organs, and subsequently apply the paste to the remaining part. This paste can be used in all the forms of cutaneous epithelioma and in all stages; but the stick of zinc is preferable for some locations, as already stated. The only objections to the paste are, the great pain it causes, more in my experience than caustic potash, and much more than an arsenious acid paste, but the experience of some observers on this point do not agree with mine; and also that it is not as elective in its action as arsenious acid or pyrogallie acid. The pain, perhaps, can be modified by adding

cocaine to the mixture, or injecting this into the tissues, and, when possible, localizing its action for the 24 hours during which the caustic is attacking the tissues. It is a good application for the papillomatous form of epithelioma, but in the distinctly epithelial form—a flat epithelioma for instance—I have found an arsenious acid paste more satisfactory. If the epidermis over the tumor has not broken down, it is better to liquify it with caustic potash before applying the paste. If the physician is satisfied that sufficient tissue has been destroyed by the paste, the resulting sore may be treated by a simple indifferent protective salve, or by an antiseptic dressing. If the loss of tissue is considerable, it is better, I think, to have the sore heal slowly, so as to have considerable granulation tissue formed, in order that the resulting deformity be as slight as possible. A little exuberant granulation tissue formation, with its subsequent normal contraction, gives the best result. There can be no question among those who have treated many cases of cutaneous epithelioma that the use of Bougard's paste is a decided advance over the use of the knife, with the few exceptions, as regards locality, mentioned when discussing the cutting operation. The resulting scar in small tumors, is unappreciable, and even when a large area is affected the deformity after cure is not great. The great advantage, however, is, that if well treated the disease is not liable to return.

In the use of arsenious acid in the form of a paste, Marsden's paste, we have an agent that in a certain class of cases has given me the best results I have obtained, and in the last eighteen years I have had considerable experience and have paid particular attention to every case, as I have been deeply interested in the subject. Marsden's paste consists of

equal parts, by weight, of arsenious acid and powdered acacia, rubbed well together, and enough water is added to make a paste about the consistence of butter. The paste must be freshly made each time it is used. It is spread upon muslin or rubber plaster in a layer about one-quarter of an inch thick, and firmly applied to the part. Marsden advises that it be not applied at one time, to a larger area than one square inch ; but I have applied it to very much larger surfaces and have never seen any injurious effects. It is not suitable for cancer of the lip, or of mucous membranes, on account of the danger of poisoning by absorption. A study of its action on a tumor of small size, will give an idea of the result obtained when the treatment is properly conducted.

Let us suppose a tumor the size of the area enclosed within the circle *a* in Fig. 9. If the epidermis is unbroken, it should be partly destroyed with caustic potash, to get the prompt action of the application. The paste is spread upon rubber plaster and fixed to the part. It should always, when possible, cover a surface extending half an inch beyond the elevated margin of the tumor, and left on from 14 to 20 hours. Within 20 hours there is no danger of the acid destroying the surrounding normal skin. Whether it be left on 14 or 20 hours in a given case, depends upon the situation and the amount of pain, which latter is to some extent a guide as to the intensity of action of the agent. If the pain is not great and the part not much swollen, it should be left on 20 hours, but as a rule 16 to 18 hours is the proper time to advise the patient to keep it applied. If the action has been satisfactory the probabilities are, that all of the tissue within *a* and some, if not all, within the circle *b*, will appear necrosed *en masse*, whilst beyond that region will appear an inflammatory process of great intensity

next the necrosed dead tissue, and, extending with diminishing intensity a considerable distance in the surrounding tissue; for instance, if the tumor is situated upon the lower part of the nose or some part of the cheek, the eyes are frequently closed by the inflammatory œdema present. The fact that the paste can be applied to the healthy skin for the same length of time without producing such destructive results, shows that it is, perhaps, what is called elective in its action. My own view is that it is a question of vulnerability of tissue as well as elective action, and as in the area between *a* and *b* the tissue is injured by the epithelial infiltration, it is destroyed if the paste is applied long enough. As all the area within *a* is epitheliomatous, that part breaks down first, and is soon followed by breaking down of the tissue between *a* and *b*, provided the part is much changed by an infiltration of epithelium. The part beyond *b* would break down more slowly than the more central tissue, as the further from the centre the less vulnerable is the tissue. As the pathological tissue is injured sooner than normal tissue, the inflammatory process, if of considerable intensity, would destroy the epithelial cells lying within the circle *c* and even beyond that line.

If the action of the arsenic is elective in character, that is, that the caustic has a preference for the epitheliomatous tissue apart from its simple pathological character, then it is easily understood how the paste would destroy the outlying epithelioma, whilst the original tissue would be scarcely injured by the inflammatory process. That this elective action does exist is shown, I think, by the difference in effect between the chloride of zinc and the arsenious acid paste. The effect of the chloride of zinc paste in 24 hours is the same as that of the arsenious acid paste

in 16 to 18 hours ; but the injury to the normal tissue is greater with the former than with the latter, consequently, the Marsden's paste has a tendency to destroy the pathological tissue in a special manner in addition to the action of a non-elective injurious agent, which destroys pathological tissue sooner than normal, provided the action requires to be exerted for a period of time to produce destruction of tissue.

Admitting that the arsenious acid has an elective action as well as one whose intensity is regulated according to the vulnerability of the tissue, and that such action would make it of special value as a destructive agent in this disease, we will now consider further the effects usually observed after its application. Referring again to Fig. 9, it is found that all the tissue within the circle *b* is necrosed, showing that the infiltration extended much beyond the makroskopical limit which was at the line *a*. This leaves a wound as large as would have been made by the knife ; but beyond that broken down area, the tissue is acutely inflamed, much more than normal tissue would be after such an application, showing that probably the infiltration was to a greater or less degree present beyond the line at *b*, that is, beyond the line of what would probably be regarded as a safe line for incision with the knife. Just as when discussing the use of caustic potash, we see that by the inflammatory process, this infiltrated epithelium would likely be destroyed, whilst the original tissue of the part returns later to a normal condition. This is the advantage over the knife, a much wider range of beneficial action from the removal or destruction of a given amount of tissue.

If the part is examined when the paste is removed, and the tissue decidedly necrosed as far as *b*, or even only to *a*, with marked inflammation for a distance

beyond, then the part should be treated as a simple wound and carefully watched. If it does not present these characters, a second application should be made at once, or a third, if necessary, and so on. The object is to obtain prompt and sufficient action. If the wound heals within a fair length of time, say within two or three weeks, and equally from all parts of the margin, no further applications should be made ; but if it refuses to heal at any one part, the paste should be reapplied to that portion ; for in that case it is certain that some of the tumor still exists at that place. If the wound heals quickly and from all parts, the patient should be kept under observation for at least one year, lest a recurrence take place, as the presence of a few isolated cancer cells would not interfere with the process of repair, as is exemplified by healing by first intention after excision when the part is treated antiseptically although a subsequent recurrence shows that all of the tumor has not been removed. If it returns, the same treatment must be again employed ; but I do not think recurrences are frequent, if the paste has acted to the desired extent, as judged by objective symptoms.

The arsenious acid paste is to be preferred in all cases where it is desirable to save as much tissue as possible. Upon the nose, for instance, I have frequently removed an epithelioma the size of a finger nail, without causing any appreciable loss of the normal tissue. From its action so far beyond the area of complete necrosis, parts can be treated that are sometimes scarcely accessible to the knife, and on this account the final results of the treatment as regards recurrences compare most favorably with the operation by excision.

If the tumor is seated just below the eye, the lachrymal secretion may interfere with the paste—

wash it away, and in that case it may be necessary to reapply a new paste several times during the 14 to 20 hours. If situated near the lid, the dropping of a four per cent. cocaine solution into the eye at intervals tends to reduce the pain to a quite bearable amount.

For the successful use of these three caustics, potash, zinc, and arsenic, several things are necessary. The physician must be able to recognize the form of tumor, he must appreciate the manner of extension of the growth and the necessity for prompt and complete removal or destruction of all of the pathological epithelium. Combined with these, some cases demand considerable experience for their successful handling if important organs, or even the patient's life is to be saved. A fault which is quite frequent with physicians is the neglect to treat the case energetically until they are thoroughly satisfied that enough tissue has been destroyed. The desire not to give the patient too much pain is usually the cause of their imperfect treatment; but after having treated a few cases unsuccessfully that error is likely to be corrected. If this paper will help to correct it with the first case it will not have been written in vain, for many deaths which have resulted from cancer, could have been prevented by active and proper treatment in an early stage.

Other agents have been used with much success in epithelioma, but the article is already too long to allow me to enter into a description of their uses. Pyrogallie acid 3i to ʒi of vaseline applied continuously for two to seven days, acts somewhat like arsenic, in an elective manner, and causes little, if any, pain. It is a suitable application for extensive perlepitheomatous lesions after curetting. Resorcin and salicylic acid (20 to 40 grains to an ounce of vaseline) some-

times act well, but are unreliable. Pyoktanin and fuchsine injected into the tumor mass or applied to the ulcerated surface have been tried and found wanting as compared with the means I have already discussed. They possess some advantages in extensive and incurable cases, but valuable time should not be wasted with trying them in an early stage. I make this statement from personal experience. In fact, with the three caustics I have specially mentioned, and with the knife in proper cases, a favorable prognosis can usually be given in all cases of cutaneous cancers seen early, and in many cases of recent mammary cancers. I have also cured with caustics, cases declared unsuitable for operation with the knife. I have no doubt but that the future will see a remedy which by injection will remove the disease, but even with the present means at our command, if they are used according to indications, cancer is not always to be regarded as an incurable disease, or one that is certain to recur, and many advanced cases are not so hopeless as supposed by the general profession. Of course, I do not refer to cancer of internal organs, certain of which, for instance, those of the liver, are with our present knowledge invariably fatal.

I regret that want of space will not permit me at present to enter still more fully into the many interesting questions connected with the subject.

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